PATENT ABSTRACTS OF JAPAN

(54) VOLTAGE GENERATOR

(57)Abstract:

PURPOSE: To calibrate a thermometer using a thermocouple temperature measuring resistor as a sensor with one set of voltage generator by giving a function which generates a resistance of the temperature measuring resistor for an arbitrarily set temperature to the voltage generator.

CONSTITUTION: A constant current outputted from the constant-current source of a thermometer 30 is converted into a voltage by means a shunt resistor 21 when the current passes through the resistor 21 before it is taken in a voltage generator 20 and the voltage read by a CPU 26 after the voltage is converted into a digital value. Then the CPU 26 finds an output voltage by finding the resistance of a temperature measuring resistor corresponding to a set temperature from a ROM 25 and multiplying the resistance by the constant current and outputs the digital data corresponding the output voltage to a D/A converter 27. The digital data are outputted to an output terminal 29 after the data are converted into an analog signal by means of the converter 27 and amplified by means of amplifiers 28.
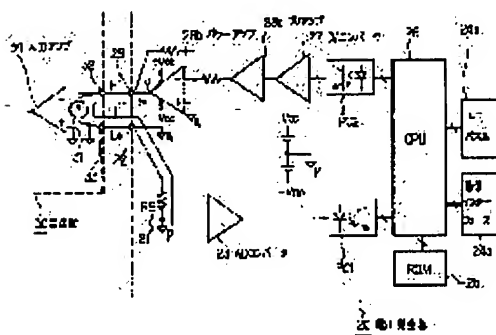
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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A current-potential conversion means to change the output current into voltage, and an AD translation means to change into digital data the voltage changed with this current-potential conversion means, A setting temperature input means to input setting temperature, and the temperature of a resistance bulb and a storing means by which the correspondence relation of resistance was stored, Ask for the output current from the digital data of the aforementioned AD translation means, and the resistance of the resistance bulb corresponding to the temperature set up with the aforementioned setting temperature input means is calculated from the aforementioned storing means. An operation means to output the digital data corresponding to the output voltage obtained by carrying out the multiplication of these output currents and the resistance of a resistance bulb, The voltage generator characterized by consisting of a DA translation means to change into an analog signal the digital data outputted from this operation means, and amplifier which amplifies and outputs the analog signal outputted from this DA translation means to the output voltage asked by the aforementioned multiplication.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to the voltage generator suitable for proofreading of the thermometer which uses a resistance bulb as a sensor about a voltage generator.
[0002]
[Description of the Prior Art] <u>Drawing 5</u> is the block diagram showing an example of the conventional voltage generator. In drawing, 1 is a voltage generator and 2 is load resistance. The digital data outputted from CPU3 of a voltage generator 1 is added to DA converter 5 through a photo coupler 4, and is changed into an analog signal. The analog signal by which a conversion output is carried out from this DA converter 5 is further amplified by the back power amplification 7 amplified with amplifier 6, and becomes the output of a voltage generator 1. If load resistance 2 is connected between the Hi output terminal 8 of a voltage generator 1, and the Lo output terminal 9, although output voltage V will be decided to the ground A which is the criteria of power amplification 7, since power supply**Vcc of power amplification 7 is made on the basis of Ground P, the output current I flows into Ground P. Moreover, in order to restrict the output current I, after changing it into voltage by the shunt resistance 10 which has

resistance Rs, it amplifies with amplifier 11, and it is added to the input of power amplification 7 through the switch 12. And if the output current I exceeds an allowed value, a comparator 13 will operate, a switch 12 will be closed, the output of amplifier 11 is applied to power amplification 7, it works in the direction which lowers output voltage, and the output current is suppressed.

[0003] Proofreading of the thermoelectric thermometer using such a voltage generator 1 can be performed by generating the electromotive force of each thermocouple in each temperature. Moreover, the correspondence relation of the temperature and electromotive force of the thermocouple of each type is beforehand stored in ROM14, and the electromotive force which corresponds only by inputting temperature can also be generated.

[0004]

[Problem(s) to be Solved by the Invention] However, if in charge of proofreading of the thermometer using the platinum resistance, for example, you have to carry out by setting up the resistance to each temperature using a dial resistor etc.

[0005] In this case, since a dial resistor etc. is used, time for the automatic calibration by communication of GP-IB etc. to also become impossible, and spend on proofreading for the devices for proofreading a thermometer not only to to increase in number, but will become long.

[0006] It is [0007] which this invention is made in view of such a conventional trouble, and is for the purpose to offer a voltage generator with the function to generate the resistance of a resistance bulb. .

[Means for Solving the Problem] A current-potential conversion means by which the voltage generator concerning this invention changes the output current into voltage, An AD translation means to change into digital data the voltage changed with this current-potential conversion means, A setting temperature input means to input setting temperature, and the temperature of a resistance bulb and a storing means by which the correspondence relation of resistance was stored, Ask for the output current from the digital data of the aforementioned AD translation means, and the resistance of the resistance bulb corresponding to the temperature set up with the aforementioned setting temperature input means is calculated from the aforementioned storing means. An operation means to output the digital data corresponding to the output voltage obtained by carrying out the multiplication of these output currents and the resistance of a resistance bulb, It is characterized by consisting of a DA translation means to change into an analog signal the digital data outputted from this operation means, and amplifier which amplifies and outputs the analog signal outputted from this DA translation means to the output voltage asked by the aforementioned multiplication.

[0008]

[Function] Although the constant current outputted from the constant current source of a thermometer for a resistance measurement is absorbed by the voltage generator through shunt resistance, it is changed into voltage by shunt resistance in the process, is changed into digital data by the AD converter, and is read into CPU. And in quest of the resistance of the resistance bulb corresponding to setting temperature, the multiplication of the CPU is carried out to a constant current from ROM, it asks for output voltage, and outputs the digital

data corresponding to this output voltage to a DA converter. A DA converter changes this digital data into an analog signal, amplifies it with amplifier, and is outputted to an output terminal.

[0009]

[Example] Hereafter, with reference to a drawing, the example of this invention is explained in detail. Drawing 1 is the principle block diagram of this invention. In drawing, 20 is a voltage generator. 21 is shunt resistance which has the resistance Rs which functions as a current-potential conversion means to change the output current into voltage, an end is connected to the Lo output terminal 22, and the other end is connected to Ground P. 23 is an AD converter which changes into digital data the voltage changed by the shunt resistance 21, the input terminal is connected to the node of resistance and Ground P, and the output terminal is connected to CPU26 used as operation part. 24 is the input section containing the key panel and communication interface which function as a setting temperature input means to input setting temperature, and is connected to CPU26. 25 is ROM used as a storing means by which the correspondence relation of the temperature and the resistance of a resistance bulb was stored, and is connected to CPU26. CPU26 asks for the output current from the digital data of aforementioned AD converter 23, calculates the resistance of the resistance bulb corresponding to the temperature set up in the aforementioned input section 24 from the above ROM 25, calculates the digital data corresponding to the output voltage obtained by carrying out the multiplication of these output currents and the resistance of a resistance bulb, and outputs the digital data to DA converter 27. The analog signal outputted from this DA converter 27 is added to amplifier 28, is amplified by the output voltage called for by the multiplication in the above CPU 26, and is outputted to the Hi output terminal 29.

[0010] Drawing 2 is the circuit diagram of the example of drawing 1 , the same number is attached to the portion which is common in drawing 1 , and those re-explanation is omitted. Key panel 24a, communication-interface 24b, and ROM25 are connected with CPU26 by bus. The output terminal of this CPU26 and AD converter 23 and the input terminal of DA converter 27 are connected through photo couplers PC1 and PC2, respectively. The output terminal of DA converter 27 is connected to power amplification 28b which can perform sink operation through preamplifier 28a. The output terminal of this power amplification 28b is connected to the Hi output terminal 29.

[0011] 30 is a thermometer which becomes a candidate for proofreading. 31 is a constant current source for measuring the resistance of the resistance bulb which is not illustrated, and is connected between the Hi input terminal 32 and the Lo input terminal 33. 34 is input amplifier, an inversed input terminal is connected to the Hi input terminal 32, and the noninverting input terminal is connected to the ground. And the Hi input terminal 32 is connected to the Hi output terminal 29, and the Lo input terminal 33 is connected to the Lo output terminal 22.

[0012] Operation of such composition is explained. The constant current I outputted from the constant current source 31 of a thermometer 30 for a resistance measurement is absorbed by power amplification 28b of a voltage

generator 20 through the path of the shunt resistance 21 ->Lo output terminal 22 ->Lo input terminal 33 -> constant-current-source 31 ->Hi input terminal 32 ->Hi output terminal 29. Here, a constant current I is changed into voltage by the shunt resistance 21, is changed into digital data by AD converter 23, and is read into CPU26.

[0013] CPU26 of a voltage generator 20 will calculate the resistance of the resistance bulb corresponding to the temperature from ROM25, if temperature is set up by key panel 24a and communication-interface 24b. And the multiplication of the resistance calculated from the constant currents I and ROM25 for which it asked previously is carried out, it asks for output voltage V, and the digital data corresponding to it is outputted to DA converter 27. DA converter 27 changes this digital data into an analog signal, amplifies it by preamplifier 28a and power amplification 28b, and is outputted to the Hi output terminal 29.

[0014] With a thermometer 30, since V/I is read as resistance, the resistance calculated from ROM25 after all can be read as it is. In addition, it is satisfactory even if it has shifted from the value (if it is Pt100 and JPt100 and is 1mA and Pt1000 0.1mA) the constant current I was decided to be since the constant current I was measured and it proofread using the value.

[0015] In the case of the resistance bulb of two lines, in order to cancel lead-wire resistance, the resistance of lead wire is measured in the resistance short state, and lengthening the resistance of lead wire from the measured value of an actual resistance bulb is performed. It is convenient if you prepare the resistance short mode (voltage 0V output) the sake [in such a case].

[0016] Moreover, highly precise proofreading can be performed by preparing a 3 line output form like drawing 3 to the resistance bulb of three lines, and preparing a 4 line output form like drawing 4 to the resistance bulb of four lines.

[0017]

[Effect of the Invention] Since the function to generate the resistance of the resistance bulb to arbitrary setting temperature is given to the voltage generator according to this invention explained above, the thermometer which uses a thermocouple and a resistance bulb as a sensor can be proofread by one set.

[0018] Moreover, the automatic calibration by GP-IB etc. also becomes possible, and the time which composition takes can also be shortened.

[Translation done.]